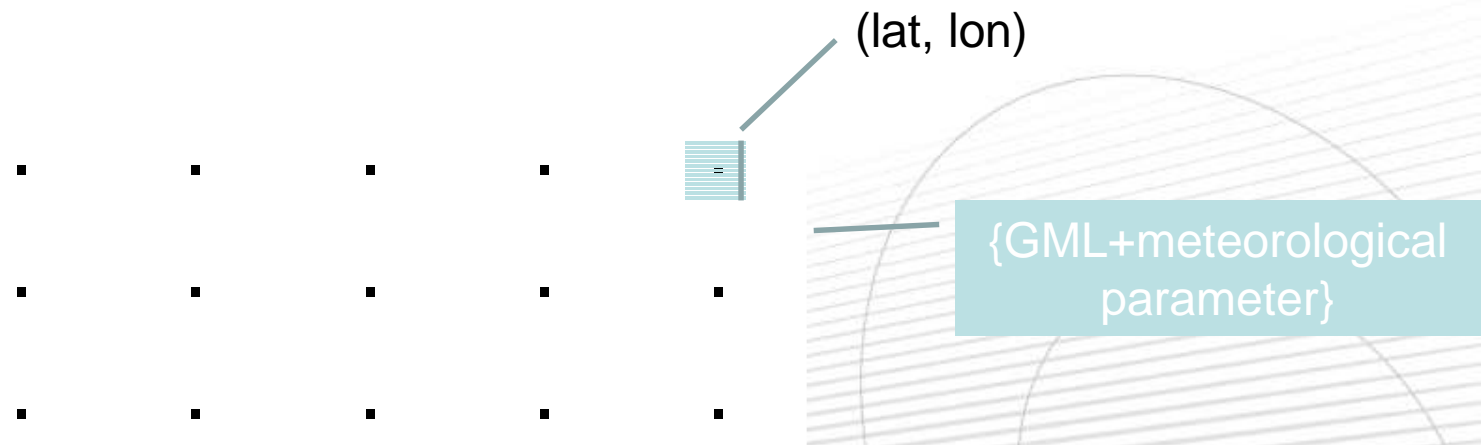# Meteorology and Oceanography, interoperability: are there anything to do with OWL?

Olivier Lauret, Christophe Camel
CLS Satellite Oceanography Division

- *Things* that makes you *think*
  - A discussion about point observations on CF Metadata (http://cf-pcmdi.llnl.gov/)

    What are meteorological stations? How can we model this?

(lat, lon)

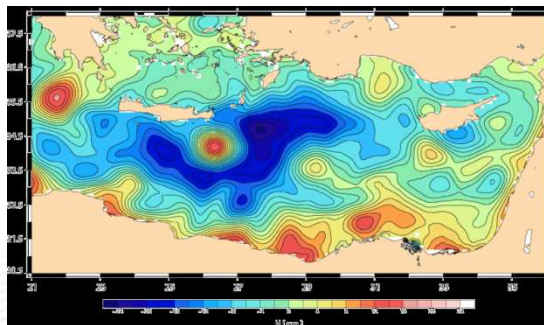{GML+meteorological parameter}

- *Things* that makes you *think*
  - But..

    Synoptic meteorology: predominant access of station data is to access many stations over a time range.

  - More generally, the concept of scale play an important role in earth sciences.

Scale characteristic about a given phenomena, eg mesoscale eddies in oceanography; scale for specific processing (global, regional..)

- *Things* that makes you *think*

    Oceanography, meteorology and climate. A world where, for
    example..

  - Resolution is not always expressed as ground sample
    distance: a number of vertical levels (ocean forecasting
    systems).
  - User does not always want to find the most-precisely-
    located-data, or the data at « best resolution », but some
    data according to a space-temporal scale.

- It's like we have to add some 'onionskins' on the basis of GML.

    How? Add some vocabulary layers? Only?

- # Thesaurus. Ontologies.

  A **thesaurus** is a work that lists words grouped together according to similarity of meaning.

  An ontology is a formal representation of a set of concepts within a domain and the relationships between those concepts. It is used to reason about the properties of that domain, and may be used to define the domain.

  (Wikipedia)

  (Thank you Wikipedia)

- # Thesaurus.
  - To make a **thesaurus** in an 'interoperable way': SKOS (W3C).
  - Mainly used today as language for metadata extension, like keywords.

Example:

A catalog interface that allows one user to discover metocean products by geophysical parameters.
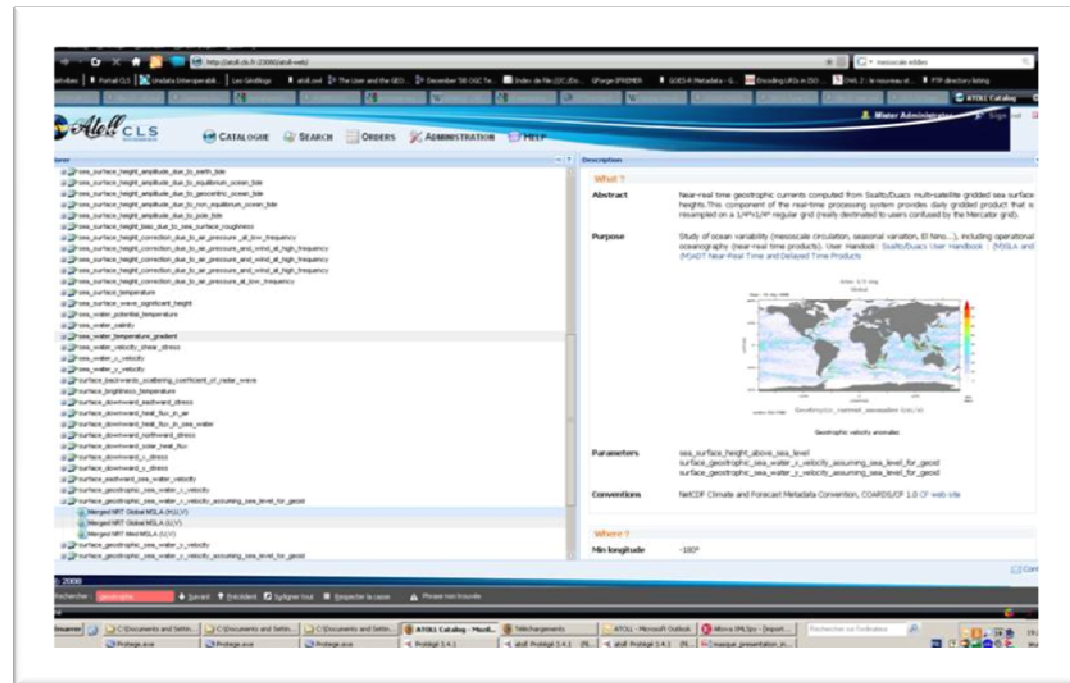
Products files are encoded using netCDF-CF conventions, geophysical field is based on CF standard names.
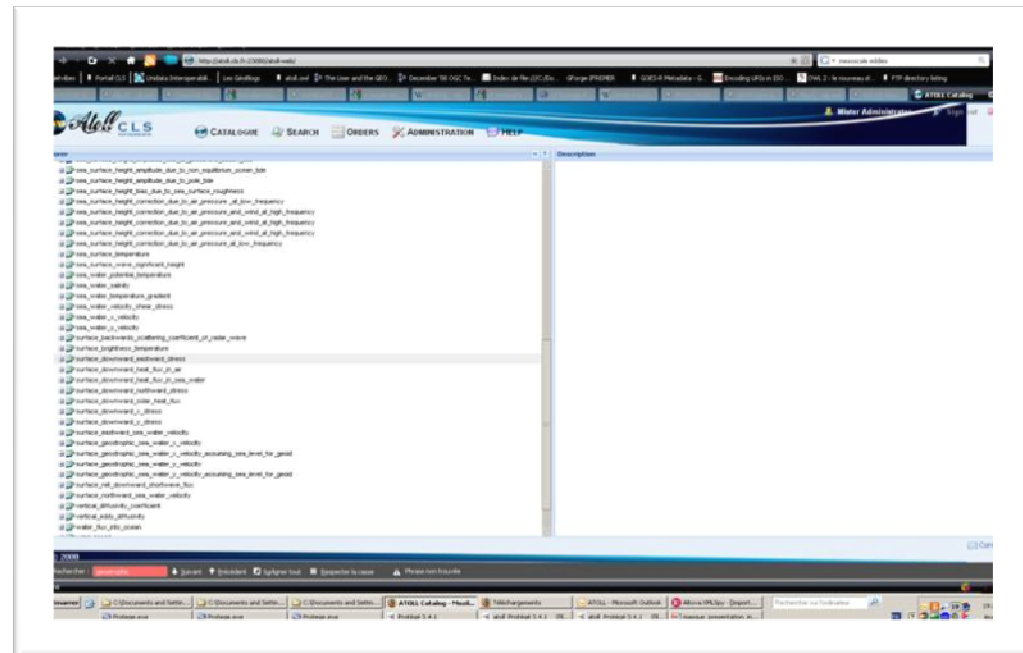
It works.

But..

Not everybody really understand *immediately* what does 'surface_geostrophic_sea_water_x _velocity_assuming_sea_level_for_ geoid' represent.

One possibility: make a SKOS version of CF standard name table, allowing multiple labelling.

Thanks to a SKOS classification, it is then possible to use CF both for automated tools (THREDDS/Opendap) and for a more user friendly metadata discovery.

Building SKOS version for CF. Protégé editor is used (http://protege.stanford.edu/).

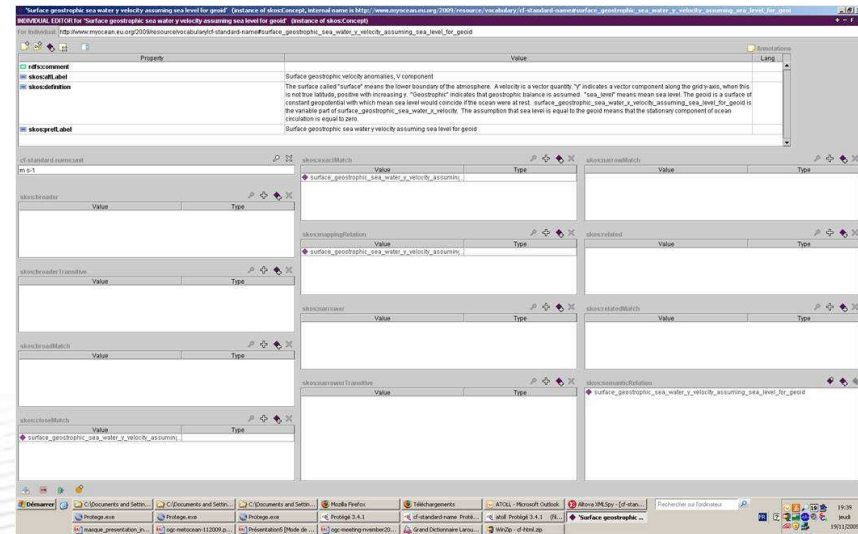The result: a file with more than 2000 entries (=vocabularies).
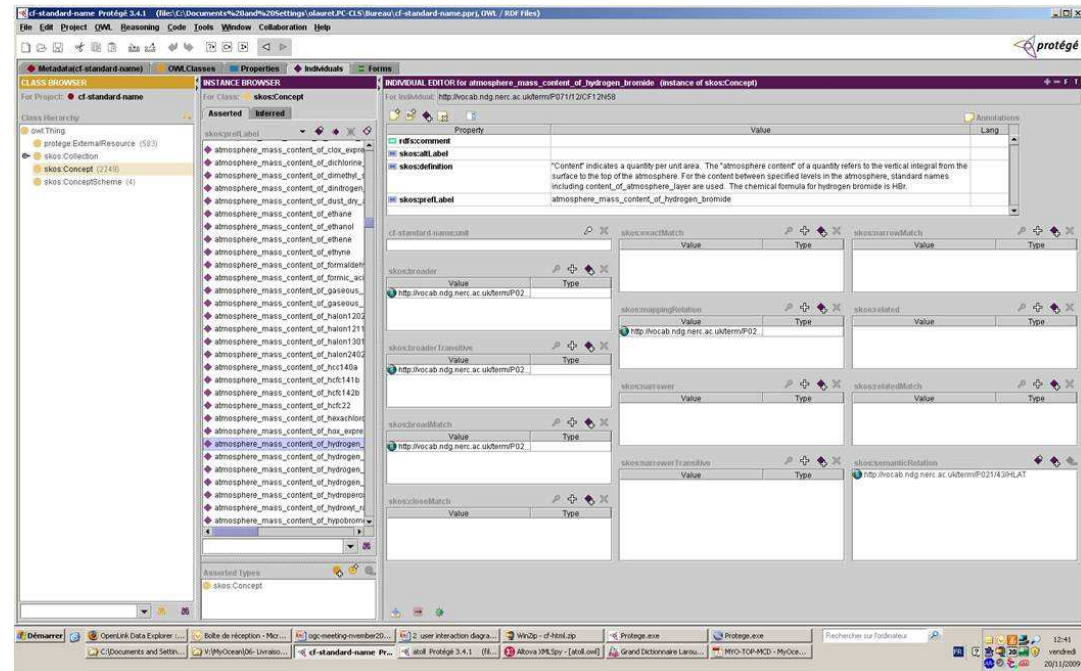
SKOS allow multilabels

sea_surface_height_above_sea_level

skos:prefLabel = 'Sea level anomaly'

skos:altLabel = 'Sea surface height anomaly'
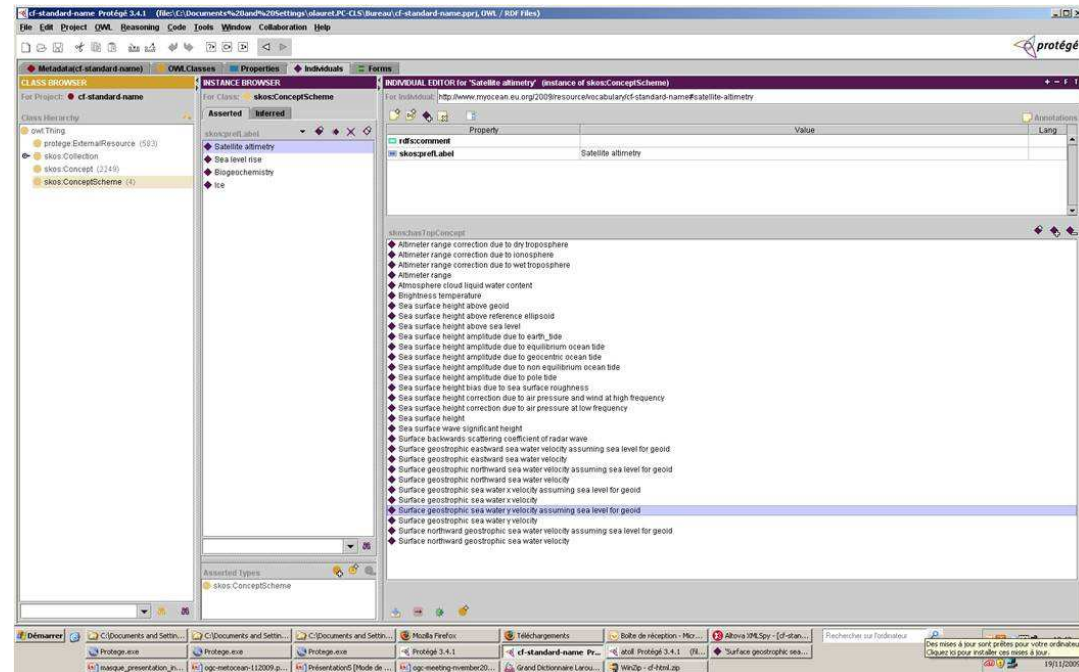
skos:definition = '…'

..and organizing vocabularies


SKOS also allows you to organize your resources.

Here 4 SKOS 'concept schemes' were made: satellite altimetry, sea level rise, biogeochemistry and ice.

One resource can belong to several concept schemes.

- OK for SKOS vocabularies, but it is a little bit restrictive. In a sense, they're only keywords..

- Sometimes we need concepts, and specific relationship between concepts.
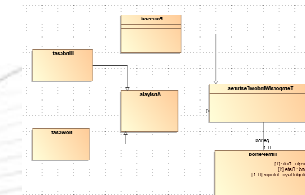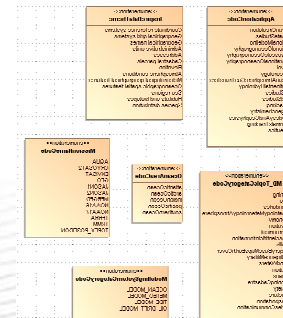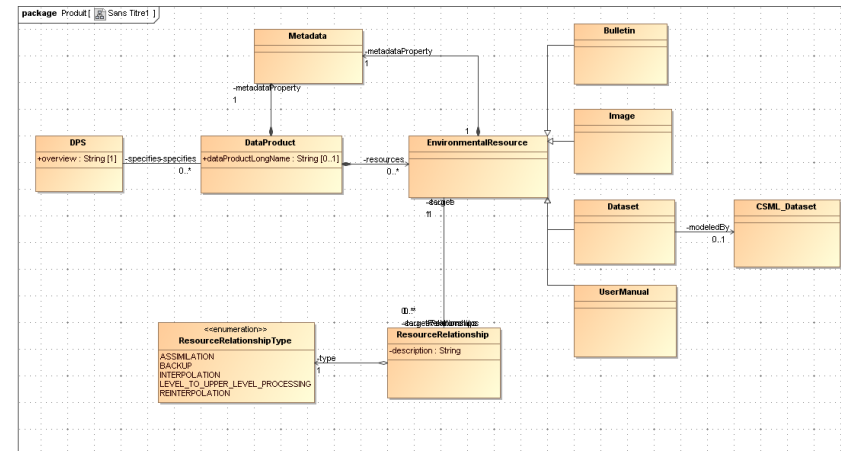
- # Ontologies. OWL.

  OWL is one solution: more expressive, but probably less easy to use.

Example: MyOcean Information System (MIS) is intended to implement many concepts (>150 pages..) and be based on OGC/INSPIRE standards.

Production Centres
Production Units
Production Units
Interfaces
Interfaces
MIS
Web Portal
Users
Existing elements
New elements
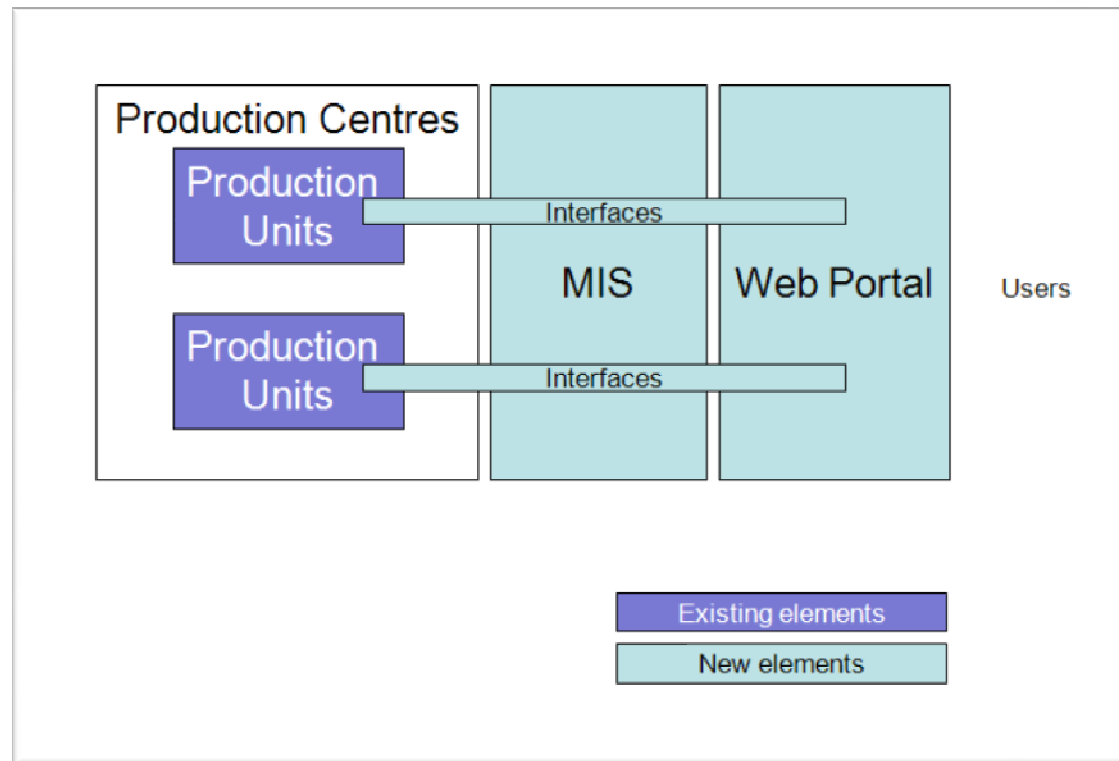
OWL Experimentations protocol:
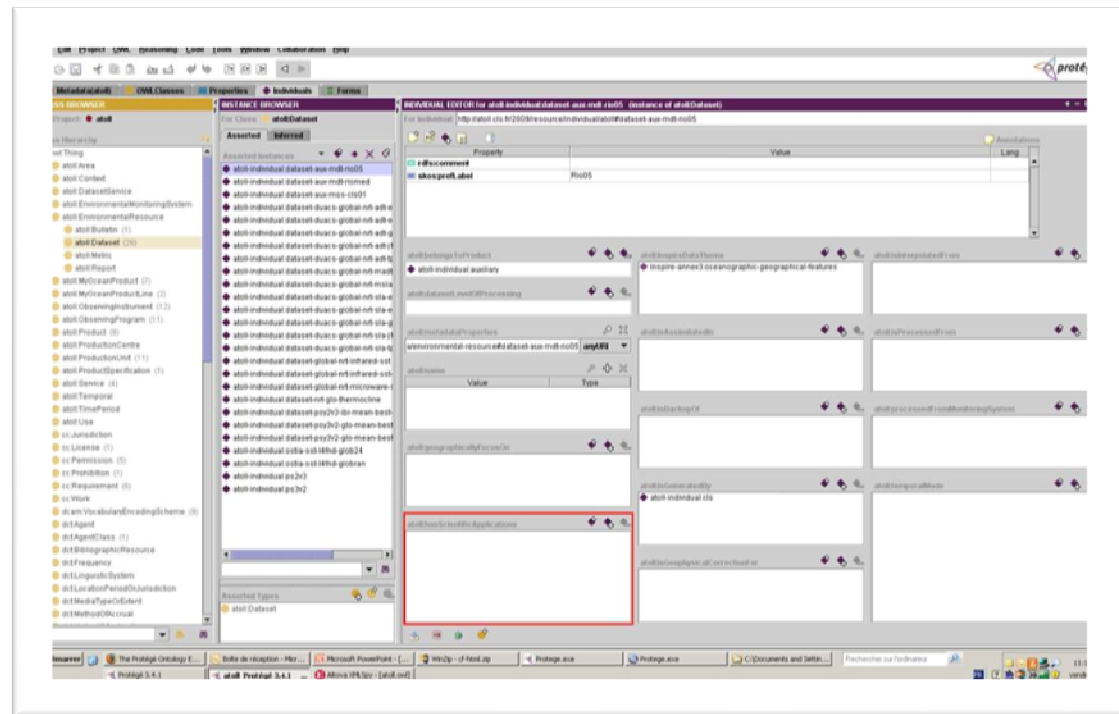
- Create classes and properties according to MyOcean requirements. Define relationships.

- Then use URIs to uniquely identify one resource.

- Finally, create the individuals according to your concepts. And enjoy.

Implementation of one data model using OWL language. The OWL editor used is still Protégé.

You can populate individuals, for ex. a dataset object, that has some relationship with other objects in the model, and where one of its properties is one ISO 19139 metadata description.

The individuals OWL source file looks like this. Not user friendly.

You can then browse the ontology.

Here using Firefox and Open Link Data Explorer add-on (https://addons.mozilla.org/en-US/firefox/addon/8062).

The navigator option of the Data Explorer allows you to easily browse the data and their relationships.

Anyone can make some queries:

What are the data assimilated in this forecasting system?

What are the ancilliary data used to compute that product? Etc.

W3C SPARQL langage is used for queries.

Are there anything to do with OWL? Yes. I think.

- Need for involvement of oceanographers and meteorologists in ontology conceptions

- Try at most to re-use existing ones

- Make your ontologies freely available, let your colleagues enrich them with other concepts. Let your ontologies grow.

- Soon to come: OGC CSW-OWL.

Thank you.